

A REDUCTION OF CLIMATE CHANGE EFFECTS THROUGH INFORMATION NETWORKS IN CCKN-IA PILOT BLOCKS OF GANJAM DISTRICT

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ABSTRACT

Agricultural growth remains the key priorities of the Government of India. Over the years, India agriculture has become more diversified and shift to high-value crops, livestock and fisheries. But agriculture is more vulnerable to climate change. It affects the lives and livelihoods of millions of Indians. Indian agriculture, not only provides food security, but also ensures livelihood security of 58 percent of the population. However, agriculture is prone to existing climate variability and is further aggravated due to impacts of climate change. The main objectives of the study are to identify the knowledge gaps of existing climate change relevant agricultural information as well as knowledge flow through technical, quantitative and qualitative assessment. To a greater extent, the Ganjam region of the Odisha is reeling under such climate stress condition. Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) would facilitate the operationalization of National Mission on Sustainable Agriculture (NMSA) in the selected block of Ganjam district of Odisha. More than 73 percent of farmers received information on contingency measures, out of which 71 percent opined that information is relevant and useful for them. Similarly, 72 percent of farmers received information on crop diseases & pests and 68.5 percent told that advisories are essential for them. More than 80 percent farmers opined that the climate change effect can be minimized through public awareness. The perception of farmers on climate change has improved from 30 percent (Benchmark) to 80.5 percent over a period of three years due to CCKN-IA project. With the limited availability of local datasets, some of the important inferences are: climate change appears to influence monsoon rainfall; total rain days during the monsoon have also decreased drastically indicating the occurrence of regular dry spells resulting in less water availability for crop cultivation.

KEYWORDS: Climate Change, Information Networks, Information Flow & Farmer's Perception

Received: Sep 22, 2018; **Accepted:** Oct 13, 2018; **Published:** Oct 31, 2018; **Paper Id.:** IJASRDEC20185

INTRODUCTION

Indian agriculture not only provides food security, but also ensure livelihood security of about 58 percent population (APEDA-Union Budget 2018–19). However, agriculture is prone to existing climate variability (J Ochieng - 2016) and is further aggravated due to impacts of climate change. Under the National Action Plan on Climate Change (NAPCC), the Government of India has launched eight National Missions during the 12th Five-year plan. The National Mission for Sustainable Agriculture (NMSA) and the Mission on Strategic Knowledge on Climate Change are targeted to achieve an agricultural growth rate of 4 percent per annum and also enable the country to cope with the impacts of a changing climate. The National Mission for Sustainable Agriculture in general spells out appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food

resources, enhancing livelihood opportunities and contributing to economic stability at the national level. The main objectives of the study are to identify the knowledge gaps of existing climate change relevant agricultural information as well as knowledge flow through technical, quantitative and qualitative assessment. In specific, it aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices. Focus areas for the mission are dry-land agriculture, risk management, access to information and use of biotechnology. The National Mission on Strategic Knowledge for Climate Change aims to get the better understanding of climate science and impacts and challenges as well as increased collaboration on national as well as international levels.

Climate Change Knowledge Network in Indian Agriculture (CCKN-IA) would facilitate the operationalization of National Mission on Sustainable Agriculture (NMSA) in the selected block of Ganjam district of Odisha. Micro-level intervention is required to overcome the situation by means of knowledge flow and knowledge network at the state and district level. Negative consequences of climate change can be suitably addressed locally by means of adaptation mechanisms which can develop people's capacity, in the long run, to adapt themselves to the existing and expected changes. Ganjam district is selected for piloting the CCKN-IA project. But the agro-climatic conditions of Ganjam district are very congenial and suitable for agriculture and horticulture crops like paddy, mango, cashew, banana, spices, cotton, Til (Sesamum), millet, maize, pulses etc. Current measures and on-going schemes are not adequate to address the problems of the rural communities pertaining to weather and climate-related. The land degradation is quite high and also the production and productivity are moderately low. The declining per capita land and freshwater availability coupled with soil erosion and land degradation in Ganjam district are posing a serious threat to the environment, social, economic, cultural and food security.

Mainly large numbers of farmers are accessed early warning messages on weather updates (Cyclone, depression, heat wave, etc.) & regular weather updates through TV & fellow farmers or neighbours in project areas. Other information's like crop diseases and pests insurgence through input dealers, DAO/ AAO & Fellow farmers. Market-related information is accessed through cooperative society and input suppliers in the project blocks. Few farmers are doing experiments with different crops like paddy, groundnut etc., the introduction of new varieties, the introduction of root crops and change in intercropping practices in Ganjam district to avoid drought and flash flood situation. Ganjam is more prone to migration and seasonally people migrate to distant places due to seasonal unemployment. Farmers have not been able to successfully utilize their potential to get maximum benefits of Integrated Crop Management practices. Poor capacity building measures and method demonstration area may be the cause of seasonal unemployment. Farmers are mainly used FYM or well-decomposed manure as the only means of organic farming. A very few number of farmers across all 2 blocks have taken to crop insurance as a guard against weather aberration. In many villages crop insurance is still a hurdle for the extension workers. Most of the farmers are using gunny bags or plastic bags or storage bins after harvesting their crops. More soil and water conservation measures are to be taken up in both the districts to avoid the crop losses.

OBJECTIVES

The main objectives of the study are

- To identify the knowledge gaps of existing climate change relevant agricultural information as well as knowledge flow through technical, quantitative and qualitative assessment.

- To support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices.

MATERIALS AND METHODS

A collection of basic information is one of the most crucial attributes used for measuring the key indicators before starting any intervention or project work. Generally, project guidelines help to finalize the benchmark which will use as indicators for post-project evaluation. The study was carried out in Ganjam district of Odisha. Two project blocks, namely, Chatrapur and Sanakhemundi are selected in Ganjam district. Selection of the district and block were purposive in view of the interest of the project. The villages were selected randomly from the two blocks representing all three categories of GPs selected (well, moderate and less developed ones) that are supposedly vulnerable to climate change and variability. The project selected 30 villages in Chatrapur and Sanakhemundi blocks of Ganjam district coming under 3 GPs per block. Primarily 4 query tools were used to collect status and take stock of the current scenario at the grass-root level as far as agriculture knowledge information flow and availability of extension services. The methods employed are household interviewer (individual farmer level), Focus Group Discussion (in groups of about 20 farmers, both male and female separately), Semi-structured interview process (interviewing better-informed persons such as PRI members, Block level agriculture officials, KVK scientists, Input suppliers, AKIS providers, etc.)

Most of the farmers facing the problem of climate changes in last 20 years in their respective areas. Agriculture is the prime source of income and livelihood of the majority section of the people in the project areas. Mainly the temperature increases up to 46⁰C in most of the project areas. They are not paying anything for services in their respective areas. Mostly they are receiving information from the Government agency and satisfied with that information. But, few farmers are not satisfied due to the authenticity of information and also sometimes it is not relevant to address their problems or cure crop diseases. They are using new farm advisory information's in their day to day life for better crop production and yield. Farmers are interested to get more information or support services during crop production, disease pest management and weather forecasting during flood, drought, and cyclone.

In view of the mentioned likely impacts of climate change and variability, it is important that policies aimed at dealing with climate change begin with educating farmers about climate change and its impacts. This way, farmers can also come up with their own local sustainable adaptation strategies. It is also important that information regarding weather is effectively disseminated to farmers so that they can plan how best to maximize yields given climate variability. Given the declining rainfall trend that has been observed over the years, it would help smallholder farmers if programs aimed at developing water harvesting and management techniques are implemented in rural communities, such as water harvesting training for farmers, construction of dams and sustainable management of water sources like WHS, Pond, rivers and streams. Interventions aimed at promoting conservation farming and adoption of high yielding seed varieties would be very instrumental in helping farmers to improve their yields despite the changing climate (reduced rainfall amounts and increasing temperatures).

There has been a clear contrast in responses of the government official's vis-à-vis non-government persons. The difference in opinion between these two categories of respondents clearly confirms the fact that there is a huge gap between "what is meant to be done and what is being done in reality". Reach out of services and knowledge information base to the bottom-most farmers are slow and bleak. Suggestions to improve present extension services and information delivery systems include the periodic interface of extension machinery with grass-roots farmers, seamless flow of

authentic, credible and demand specific information on weather, sudden climatic aberrations, and crop-weather advisories through all possible media – TV, Newspaper, Mobile and leaflets/pamphlets in the local language.

RESULTS AND DISCUSSIONS

As agriculture is the major sufferer of the climate change, suitable mechanisms, as per the present proposition, will help people to restore their livelihood and augment the food production scenario even at the adverse climatic conditions. Now agricultural information plays a dominant role in agricultural development. Information on contingency measures plays a crucial role in CCKN-IA project blocks.

Table 1: Availability of Agriculture Related Information and ICT Adoption in Agriculture

Farmers have Received Agriculture and Related Information Last 3 Years and What form this Takes (Percentage Wise)											
Block	Crop-Specific Advisories			Crop Diseases & Pest Related Adv.			Livestock/Fishery Advisories			Contingency Measures Advisories	
	YES (%)	Source of Information	Useful/ Relevant (%)	YES (%)	Source of Information	Useful/ Relevant (%)	YES (%)	Source of Information	Useful/ Relevant (%)	YES (%)	Source of Information
Chatrapur	72	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	62	73	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	69	67	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	65	74	AAO, VAW, TV, KVK, Friend, input dealers, IKSL, Mobile Message/Voice message, CCKN-IA Information board
Sanakhemundi	69	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	60	71	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	68	65	AAO, JHO, VAW, TV, KVK, Friend, input dealers, Govt. Officials, IKSL, Mobile Message/Voice message	62	72	AAO, VAW, TV, KVK, Friend, input dealers, IKSL, Mobile Message/Voice message, CCKN-IA Information board
Average	70.5		61	72		68.5	66		63.5	73	

Information on contingent measures, crop diseases and pests, crop specific advisories and livestock & fishery related information is essential for farming communities. More than 73 percent farmers received information on contingency measures, out of which 71 percent opined that that information is relevant and useful for them. Similarly, 72 percent farmers received information on crop diseases & pests and 68.5 percent told that advisories are essential for them. More than 80 percent farmers opined that the climate change effect can be minimized through public awareness.

Table 2: Perception of Farmers on Climate/Weather Change (Percentage Wise Responses)

Block	Have Farmer Faced a Climate-Related Crisis (e.g. Flood, Drought, Frost, Tidal Surge) in the Last 20 Years?								What Kind of Losses Farmer Suffered?				When this Occurred, Did Farmer Receive Some Assistance?				
	Flood	Drought	Late Onset of Monsoon	Prolonged Dry Spell	Cyclone	Unseasonal Rainfall	Frost / Cold Spell/ Fog/ Hailstorm	Others if any (Like Epidemics)	Partial Crop Loss, Specify Kind of Crop	Complete Crop Loss (Specify)	Loss of Livestock	Others (Specify)	Government Agencies	NGOs/Community Based Organizations	Religious Organizations	Private Organizations	Insurance
Chatrapur	70.0	87.5	67.5	37.5	95.0	62.5	2.5	0.0	15.0	90.0	10.0	2.5	75.0	0.0	7.5	2.5	7.5
Sanakhemundi	92.5	90.0	60.0	25.0	90.0	65.0	10.0	10.0	2.5	95.0	5.0	0.0	90.0	0.0	7.5	2.5	2.5
Average	81.25	88.75	63.75	31.25	92.5	63.75	6.25	5	8.75	92.5	7.5	1.25	82.5	0	7.5	2.5	5

The perception of farmers on climate change has improved from 30 percent (Benchmark) to 80.5 percent over a period of three years due to CCKN-IA project. It was only possible through convergences of information's flow and networks among all line department officials. The agro advisories flow to the village level information board in the project villages through project staff. Major visible effects of climate change in the project blocks change in rainfall pattern, rising of temperature, erratic rainfall/intense rainfall a shift in the month of maximum rainfall to August, depletion of groundwater, drought, and incidence of diseases and pests. It shows that 84 percent villagers said rainfall pattern has changed due to climate change. Similarly, 72.5 percent farmers told the temperature has increased significantly and the occurrence of natural calamities like drought and cyclone has increased. The unbridled growth of population and their multiplication needs are putting pressure on natural resources, mainly on land, water, and plants, which is now under

threat. To ensure future food and water security, the vertical and horizontal expansion of production has to be effected without degrading productivity. About 76.5 percent farmers opined that indiscriminate use of fertilizers and pesticides causes more human health hazards in the project villages.

Table 3: Information Networks Change the Opinion Farmers after Execution of CCKN-IA Project in Two Blocks

	Opinion of Farmers (%) Chatrapur Block	Opinion of Farmers (%) Sanakhemundi Block	Average Opinion of Farmers (%)
Perception of Farmers on Climate Change			
They are aware of it	82	79	80.5
They do not know about it	11	13	12
They have partial knowledge	7	8	7.5
What are the Visible Effects of Climate Change in their Respective Blocks			
Climate changes in rainfall pattern	86	82	84
Delay in onset of monsoon	71	70	70.5
Reduction in no of rainy days	69	65	67
Shift in Month of maximum rainfall to August	75	73	74
Shift in Month of return of monsoon to October	67	61	64
Groundwater level decreases	81	76	78.5
Change in Temperature			
Increased Maximum Temp in summer	74	71	72.5
Reduced gap between maximum and minimum temp	65	64	64.5
Occurrence of Natural Calamities Like Drought and Cyclone			
Increase in frequency	68	67	67.5
Change in Cropping Pattern			
Decrease in area of cereals	65	62	63.5
Increase in area of pulses and oilseeds	70	66	68
Increase in area of vegetables	65	62	63.5
Increase in area of fruits	45	41	43
Incidence of Disease and Pests in Crop Field			
Increase in Incidence of pests-BPH, Stem borer	82	78	80
Increase in Incidence of diseases-BLB, Blast	76	65	70.5
Effect on Health of Animals			
Increase in FMD, worm attack, anthrax, gastritis	78	79	78.5
Effect on Human Health			
Increase in communicable diseases	67	69	68
Increase in non- communicable diseases	69	65	67
Any Other			
Increase in forest fire	67	66	66.5
Increase in paddy straw fire	83	79	81
Increase in water pollution	87	85	86
Increase in incidence of fog	65	60	62.5
Early drying of water bodies	71	69	70
Effect on Health and Nutrition of Family			
Increase in health and illness of family	78	75	76.5
Deforestation			
Heavy demand for wood due to overpopulation	89	83	86
Poor function of JFM/Bana Surakhya Samiti	35	38	36.5
Poor awareness among villagers (Social fencing)	43	37	40
Open grazing of animals	42	41	41.5
Use of Chemicals in Agriculture			
Unscientific use of rampant pesticides in crops	78	75	76.5
Injudicious fertilizers use	83	79	81

Table 3: Contd.,			
How To mitigate the Ill-Effects of Climate Change			
Plantation in large scale	92	88	90
Use of climate resilient technologies	74	71	72.5
Organic farming	82	81	81.5
Use of implements and machinery in agriculture	45	46	45.5
Growing short duration varieties of crops	58	62	60
Growing crop varieties resistant to disease and insect	73	72	72.5
Intercropping and mixed cropping	78	75	76.5
Adoption of integrated farming system	79	81	80
Water saving technologies for better use of water	82	79	80.5
Judicious use of farm resources	89	78	83.5
Followed HYV of crops and vegetables	82	77	79.5
Followed water-saving technologies	79	81	80
Practiced ICM, INM, IPDM and IWM measures	78	76	77
Focused on alternative livelihood options like-mushroom cultivation, Rearing colour birds, Duckery, Goatery and Dairy farming	76	75	75.5
Do you think the risk of climate change can be minimized through awareness?	82	79	80

The ill effect of climate change can be mitigated by creating basic awareness among farmers. The policymakers are to address the key problems and friendly policy. In this context, 90 percent of the farmers told large-scale plantation can minimize the change effect. Farmers opined that in lieu of inadequate life saving irrigation water, most of their crops fail due to moisture stress. A concerted effort on water conservation and harvesting techniques on the part of ongoing government effort could deal with moisture stress. Similarly, flood resistant varieties could withstand short duration, high-intensity paddy in low land condition. Various IPM / INM techniques are tested in project villages that help to minimize the change effect.

A skewed response is found when it comes to persons hailing from (in-service) government department portraying an impression as if generally farmers have better access to relevant information and knowledgebase. There has been a clear contrast in responses of government official's vis-à-vis non-government persons. The difference in opinion between these two categories of respondents clearly confirms the fact that there is a huge gap between "what is meant to be done and what is being done in reality". Vital clues come as regards to needing for more frequent, timely and authentic information on climate/ weather variability, crop advisories and best practices as per local requirements to be provided to farmers through best available media -mobile phone, TV, Training & demonstration, physical interaction. IKSL services are reaching to a few farmers, though adoption rate and relevance and need specificity of those messages are still questionable. Krishi Vigyan Kendra and Dy. The director, Agriculture office being present in Chatrapur and Sanakhemundi blocks has a good reach to farmers and villages in terms of passing on various messages/practices/inputs to farmers. The overarching demand for mobile messaging services, training/campaigns and distribution of IEC materials among farmers on climate/weather change and contingent crop measures/advice is clearly concluded. A feedback (two-way communication) mechanism to gauge farmers/users' perception after being delivered with information should be in place to ensure greater acceptability and minimize the climate change effect.

CONCLUSIONS

Apart from direct benefit, this intervention will yield sufficient experience and enrich understanding of the planners and policymakers on micro-level implications of climate change and possible remedial measures from the agriculture point of view. The model so developed will have the potential to get replicated in many other parts of the country where such adverse climatic conditions and climate change impact persists. Data authentication and utilization of local knowledge (extension workers/ progressive farmers) have also been highlighted to create value for information flow. Proper motivation and awareness creation among farmers is of utmost importance as of now a few progressive farmers are able to reap benefits of information/knowledge and government beneficial schemes. Proper coordination among various change agents like GO, NGO, Pvt. Agencies, Mobile/internet agencies are required at this moment to minimize the adverse effect of climate change.

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